Introduction to data processing and image recognition using Python and TensorFlow

Workshop activity session 17
April/May 2021

Duration: 45 minutes

Activity session 17 overview

The aim of this session is to investigate linear regression used in machine learning. Linear regression can be either simple or multiple linear regression, depending on the number of independent variables.

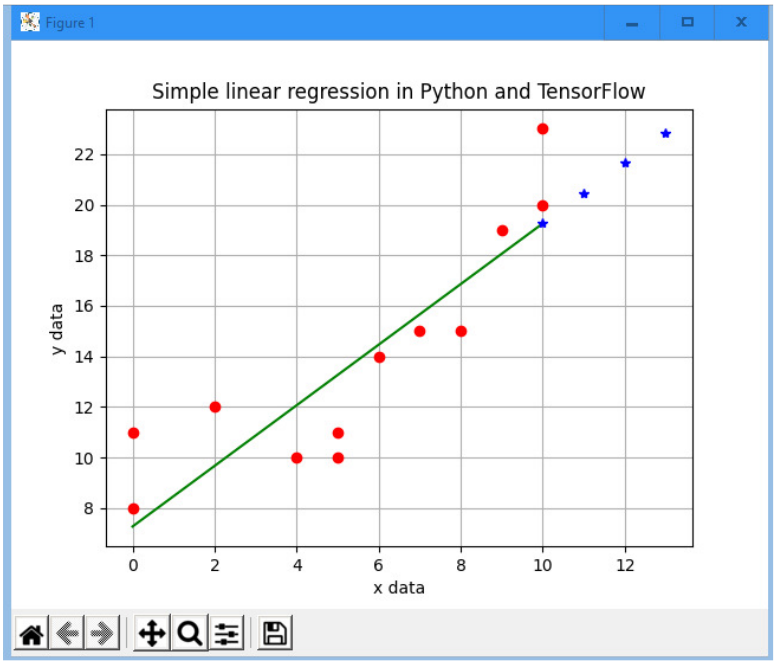
Part 1: Simple linear regression

Simple linear regression is a regression model that estimates the relationship between one independent variable (conventionally `x`) and one dependent variable (conventionally `y`) using a straight line.

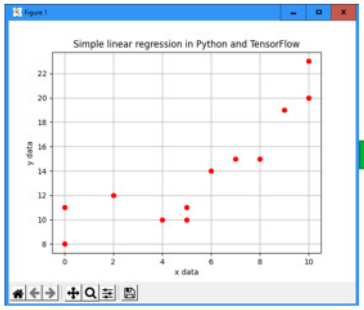
The `x` and `y` coordinates are in a Cartesian coordinate system.

The simple linear regression model is a straight line of the form:

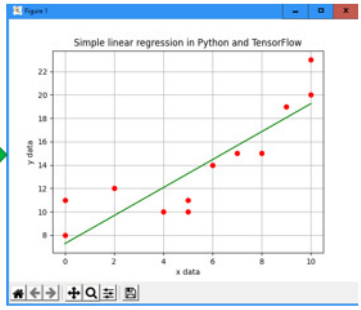
$$y = ax + b$$



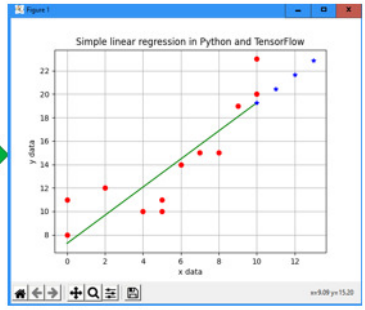
It is possible to use different mathematical algorithms to solve the problem including the training (fitting) of a deep learning model.



Training data to train the model

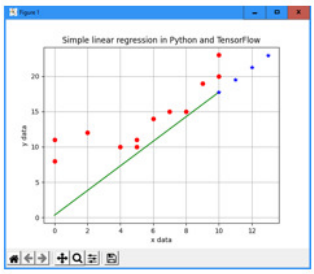


Model of the form $y = ax + b$



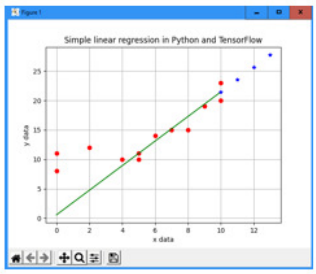
Use the model to predict values

When training a model, the developer must select the number of epochs used to train the model. For example:



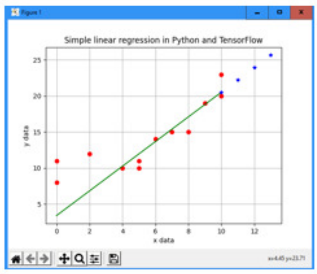
epochs = 1

y = 1.744 + 0.316



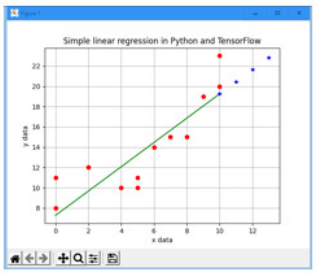
epochs = 10

y = 2.089 + 0.568



epochs = 100

y = 1.713 + 3.400



epochs = 500

y = 1.197 + 7.286

It is possible is care is not taken to either underfit or overfit the model.

Considerations include:

1. Increasing the number of values in the training dataset.

2. Varying the structure of the model.

3. Underfitting – the model cannot adequately capture the underlying structure of the data.

4. Overfitting – the model corresponds too closely, or exactly, to a particular set of data. It may fail to fit additional data or predict future observations reliably.